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SMR-F & SMT-F Modules

Air and Fluid Pass-through

SmartChange Tool Change System

Manual 95403 Rev 00

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Revision

Revision	Date	Author	Description
00	11-16-2009	GV	Initial release

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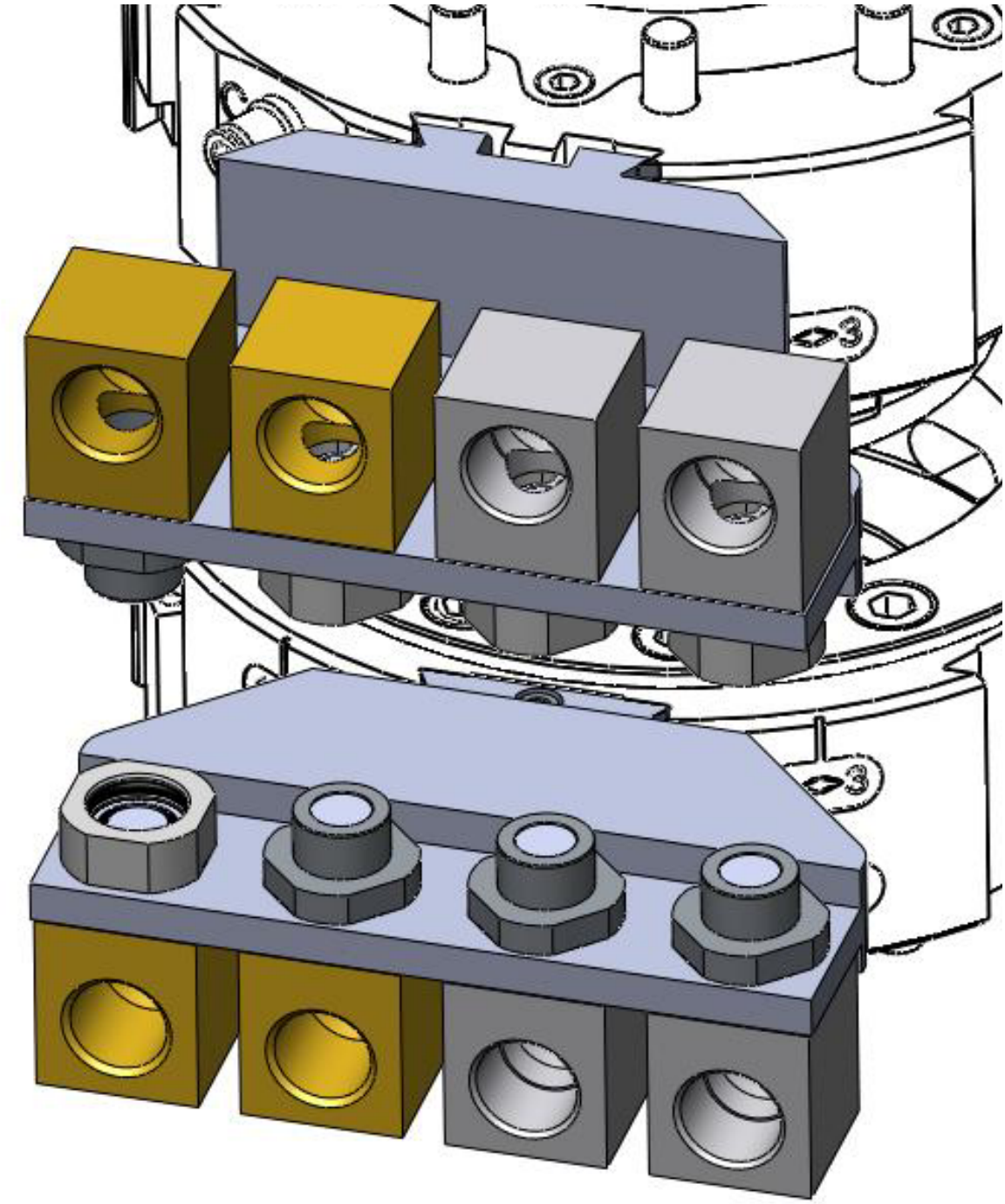
1 System Description

The SmartChange SMR-F and SMT-F modules provide a method of passing air and fluid, such as coolant, through the tool changer. The mounting bracket for these modules allows for the option of up to four 1/2 inch fittings. Both male and female fittings are self-closing and seal once they are separated. The normal method of hose connection is via 1/2“ NPT or G1/2 (BSPP) female threads.

The tool side SMT-F modules also work in conjunction with the robot side SMR-V series of modules that include a solenoid valve for controlling the actuating cylinder of the tool changer.



2 Safety / Standards

2.1 Safety Notices

READ MANUAL—Do not start, operate or service machine until you read and understand User's Manual. Failure to do so could result in serious injury.

HAND CRUSH NOTICE—Indicates the possibility for a crush force between components during coupling of the Robot and Tool adaptors.

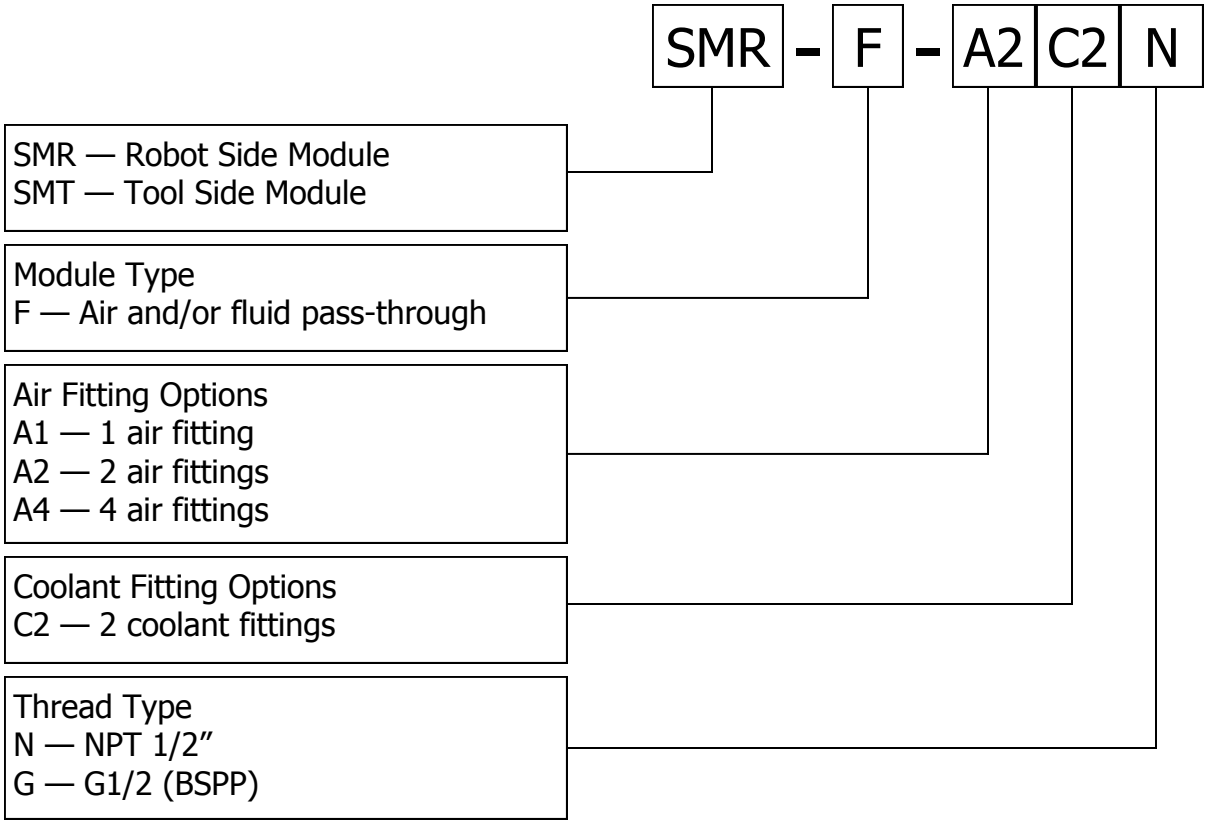
DANGER NOTICE — Indicates an imminently hazardous situation which, if not avoided, will result in serious injury or death.

WARNING NOTICE — Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.

CAUTION NOTICE — Indicates a potentially hazardous situation which, if not avoided, will or could result in minor or moderate injury; also used where the risk applies only to property damage.

IGNORING INFORMATION ABOUT POTENTIAL HAZARDS CAN LEAD TO SERIOUS HARM TO PERSONNEL AND/OR DAMAGE TO THE EQUIPMENT, AND MAY RESULT IN THE

3 Ordering Information


SMR - F - A2 C2 N
SMR — Robot Side Module
SMT — Tool Side Module
Module Type
F — Air and/or fluid pass-through
Air Fitting Options
A1 — 1 air fitting
A2 — 2 air fittings
A4 — 4 air fittings
Coolant Fitting Options
C2 — 2 coolant fittings
Thread Type
N — NPT 1/2”
G — G1/2 (BSPP)

4 Technical Specifications

Module Robot / Tool	Number of fittings		Thread Size/ type	Maximum Working Pressure	Cv
	air	coolant			
SMR-F-A1N / SMT-F-A1N	1	0	1/2” NPT	17 Bar (250 psi)	1.54
SMR-F-A2N / SMT-F-A2N	2	0			
SMR-F-A4N / SMT-F-A42N	4	0			
SMR-F-A1G / SMT-F-A1G	1	0	G1/2 (BSPP)		
SMR-F-A2G / SMT-F-A2G	2	0			
SMR-F-A4G / SMT-F-A4G	4	0			
SMR-F-A1C2N / SMR-F-A1C2N	1	2	1/2” NPT		
SMR-F-A2C2N / SMR-F-A2C2N	2	2			
SMR-F-A1C2G / SMR-F-A1C2G	1	2	G1/2 (BSPP)		
SMR-F-A2C2G / SMR-F-A2C2G	2	2			

4 Installation

4.1 Module Mounting and Removal

The SMR-V modules include a male dovetail feature that match up to the six dovetail slots around the perimeter of the SmartChange robot adaptor assemblies. Each module is located to the robot adaptor housings using the dovetail feature and retained by a single captivated fastener for easy installation and replacement. Typical installation for this module is in position 2.

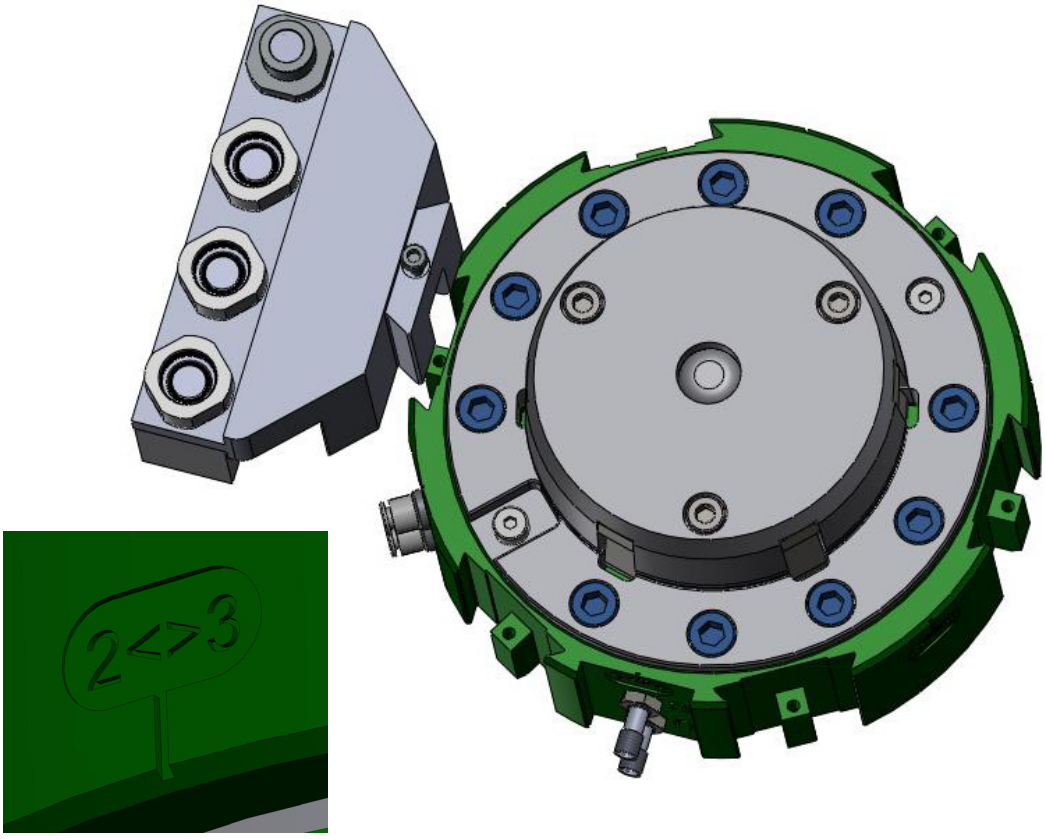
The following steps should be taken for proper installation:

4.1.1 Module Mounting

1. Determine the desired position for the utility module to be positioned. The robot and tool adaptor housings are marked with a number and an arrow between each dovetail slot to designate module positions.
2. Ensure dovetail features on both the utility module and the robot or tool adaptor housings are free from burrs or raised material that would cause interference.
3. Slide the male dovetail feature of the utility module into the desired female dovetail of the robot or tool adaptor housing until it bottoms out on the threaded male feature of the robot or tool adaptor housing.
4. Using a 4mm hex wrench, insert and tighten the M5 captivated socket head cap screw to a torque value of 5.5 Nm (48in-lbs).

4.1.2 Module Removal

1. Using a 4mm hex wrench, loosen the M5 captivated socket head cap screw in the male dovetail feature of the utility module until it is free from the threads in the robot or tool adaptor housing. Do not continue loosening this screw out of the utility module so that it will remain captivated.
2. Slide the male dovetail feature of the utility module out of the female dovetail slot of the robot or tool adaptor housing.



5 Troubleshooting

5.1 Troubleshooting Guide

Symptom	Possible Causes	Resolution
Fitting Leak	Dirt, Debris, or hard scale fouling seal surfaces	Clean fitting and lubricate per Section 8.3 of this manual
	Damage to sealing surfaces	Replace fitting per Section 8.4 of this manual

For troubleshooting issues not covered in this guide please contact the Applied Robotics Technical Support Department at (518)384-1000 or techsupport@appliedrobotics.com.

7 Spare Parts

The spare parts listed below are recommended to be maintained in stock for the life of the unit. These quantities are based on a single unit. If higher quantities are purchased please contact our Technical Support Department at 518-384-1000 or techsupport@appliedrobotics.com to determine the quantity of spares we recommend for the size of your installation.

Recommended Spares for SMR-F module with A (air fitting) option		
Description	**Part Number**	**Quantity**
Female Fitting LPF-08F-SS-EXTENDED	0509-C38A	1-4[1]

Recommended Spares for SMR-F module with C (coolant fitting) option		
Description	**Part Number**	**Quantity**
Male Fitting LPF-08M-SS-EXTENDED	0509-C39A	1
Female Fitting LPF-08F-SS-EXTENDED	0509-C38A	1

Recommended Spares for SMT-F module with A (air fitting) option		
Description	**Part Number**	**Quantity**
Male Fitting LPF-08M-SS-EXTENDED	0509-C39A	1-4[1]

Recommended Spares for SMT-F module with C (coolant fitting) option		
Description	**Part Number**	**Quantity**
Male Fitting LPF-08M-SS-EXTENDED	0509-C39A	1
Female Fitting LPF-08F-SS-EXTENDED	0509-C38A	1

[1] *Quantity required based on specific SMR-F & SMT-F module. Quantity required will match the number following A in the module part number. For example, SMR-F-A4N requires 4 female fittings and SMT-F-A2C2G requires 2 male fittings for the air pass through.*

8 Maintenance

CAUTION

FAILURE TO FOLLOW THE MAINTENANCE SCHEDULE DESCRIBED BELOW COULD ALTER OR VOID THE WARRANTY PROVIDED BY APPLIED ROBOTICS.

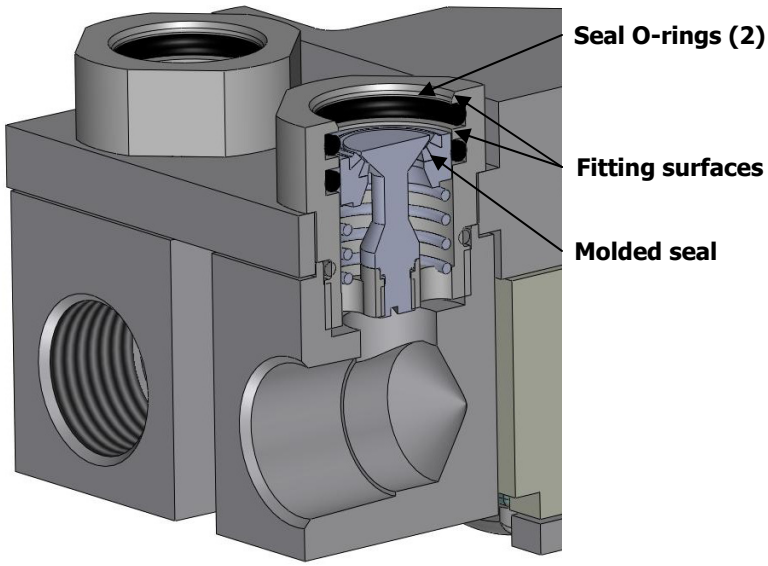
8.1 Maintenance Schedule

Maintenance Items	Frequency of Maintenance	
	Female Fittings	Male Fittings
Visual Checks	Every 2 weeks (> 1000 cycles per day) Every 4 weeks (< 1000 cycles per day)	
Lubrication	250,000 cycles or as necessary based on visual inspections	
Fitting Replacement	1,000,000 cycles	

8.2 Visual Checks

8.2.1 Female Fittings

1. Inspect fitting surfaces adjacent to o-ring seals for excessive wear or raised material[1] that could cause damage to sealing surfaces on the corresponding male fitting.
2. Inspect seal o-rings and molded seal for damage or excessive build-up of dirt, debris, or hard scale[2].
3. Inspect o-rings for proper lubrication[2].

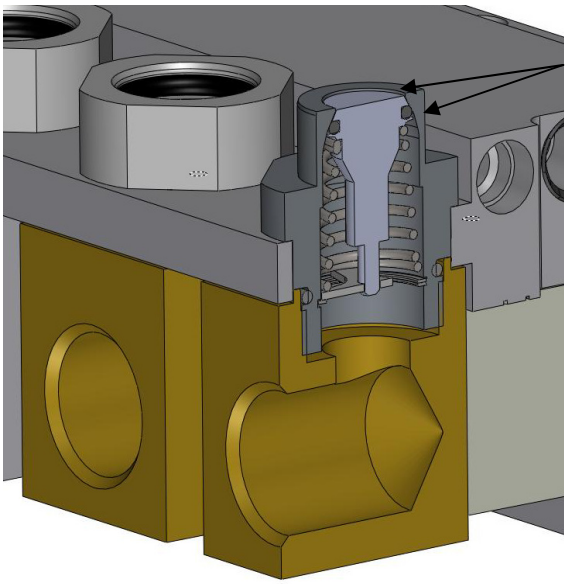


[1]*If excessive wear or damage is found in any of the surfaces of the male or female fitting they should be replaced following the procedures in Section 8.4 of this manual. Leaving the fittings in place with damaged interface surfaces will lead to premature failure of the o-ring and molded seals.*

[2]*If excessive build-up of dirt, debris, or hard scale is present or a lack of proper lubrication is found during the performance of visual checks, the fittings should be cleaned and lubricated per Section 8.3 of this manual.*

8.2.2 Male Fittings

1. Inspect outer sealing surfaces for excessive wear or raised material[1] that could cause damage to seal o-rings or molded seal in the corresponding female fitting.
2. Inspect outer sealing surfaces for excessive build-up of dirt, debris, or hard scale[2].
3. Ensure outer sealing surface is properly lubricated[2].

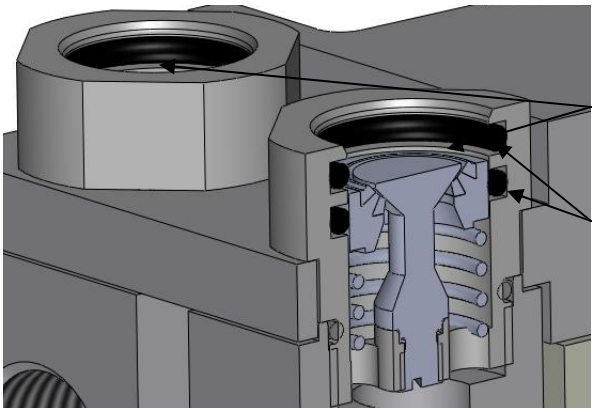


8.3 Lubrication

The following procedures will define the proper method for lubricating the Female fittings utilized in the SMR-F & SMT-F modules to maximize the cycle life of your SmartChange system.

8.3.1 Female fitting

1. Clean the inner cavity of the female fitting of on any existing grease, dirt, or debris using a clean lint free rag.
2. Apply a liberal coating of Staburags NBU 30 grease (ARI part # 0903-P11N) to the inner cavity of the fitting along the entire diameter. The coupling of the female fitting to the male fitting will force the grease to the lower o-ring and also lubricate the outer surfaces of the male fitting[3].



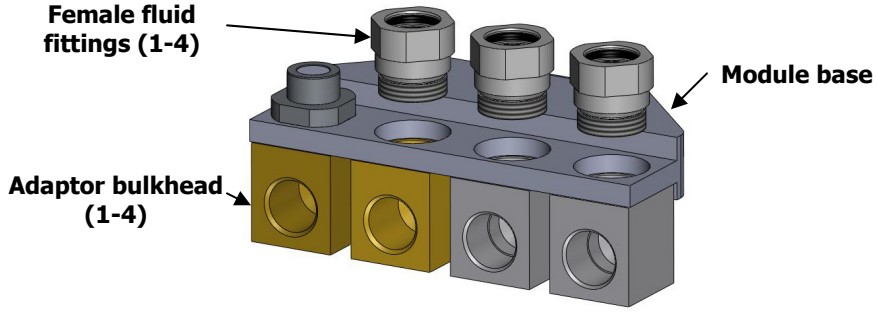
[1]*If excessive wear or damage is found in any of the surfaces of the male or female fitting they should be replaced following the procedures in Section 8.4 of this manual. Leaving the fittings in place with damaged interface surfaces will lead to premature failure of the o-ring and molded seals.*
[2]*If excessive build-up of dirt, debris, or hard scale is present or a lack of proper lubrication is found during the performance of visual checks, the fittings should be cleaned and lubricated per Section 8.3 of this manual.*
[3]*This method allows for no direct lubrication being required for the male fitting*

8.4 Spare Part Replacement

The following procedures will explain the correct method for removing and replacing the recommended spare parts listed in Section 8 of this manual. All of these procedures can be performed without removing the modules from their respective robot or tool adaptors.

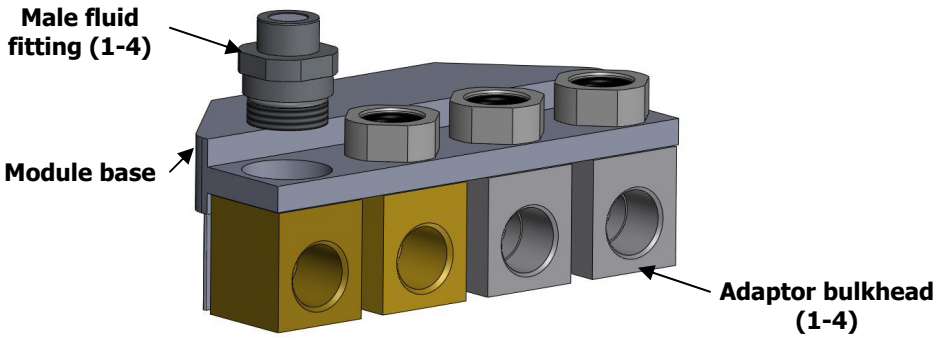
8.4.1 Female fluid fittings

1. Ensure air and fluid lines for the fittings are shut off and drained if necessary.
2. Using a 27mm open end wrench, loosen and remove the female fluid fitting. The adaptor bulkhead and attached tube/hose will be free from the module.
3. Ensure the M24 x 1.5 threads on the fitting and in the bulkhead adaptor are clean and free of dirt and debris.
4. Also ensure seal o-ring is also clean and free from dirt, debris, or hard scale.
5. Insert the new female fluid fitting into the adaptor bulkhead through the module base and tighten the fitting using a 27mm open end wrench to a torque value of 5 Nm (45 in-lb).
6. Ensure fitting in properly lubricated per Section 8.3 of this manual before use.



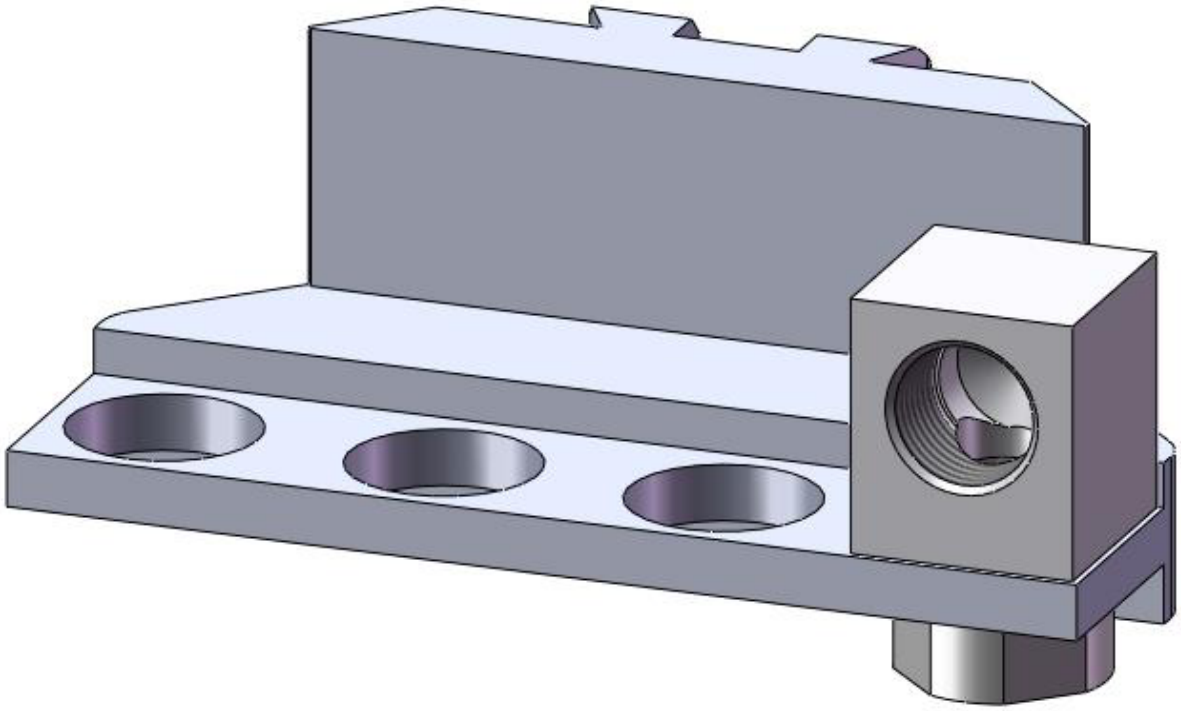
8.4.2 Male fluid fittings

1. Ensure air and fluid lines for the fittings are shut off and drained if necessary.
2. Using a 27mm open end wrench, loosen and remove the male fluid fitting. The adaptor bulkhead and attached tube/hose will be free from the module.
3. Ensure the M24 x 1.5 threads on the fitting and in the bulkhead adaptor are clean and free of dirt and debris.
4. Also ensure seal o-ring is also clean and free from dirt, debris, or hard scale.
5. Insert the new female fluid fitting into the adaptor bulkhead through the module base and tighten the fitting using a 27mm open end wrench to a torque value of 5 Nm (45 in-lb).
6. Ensure fitting in properly lubricated per Section 8.3 of this manual before use.

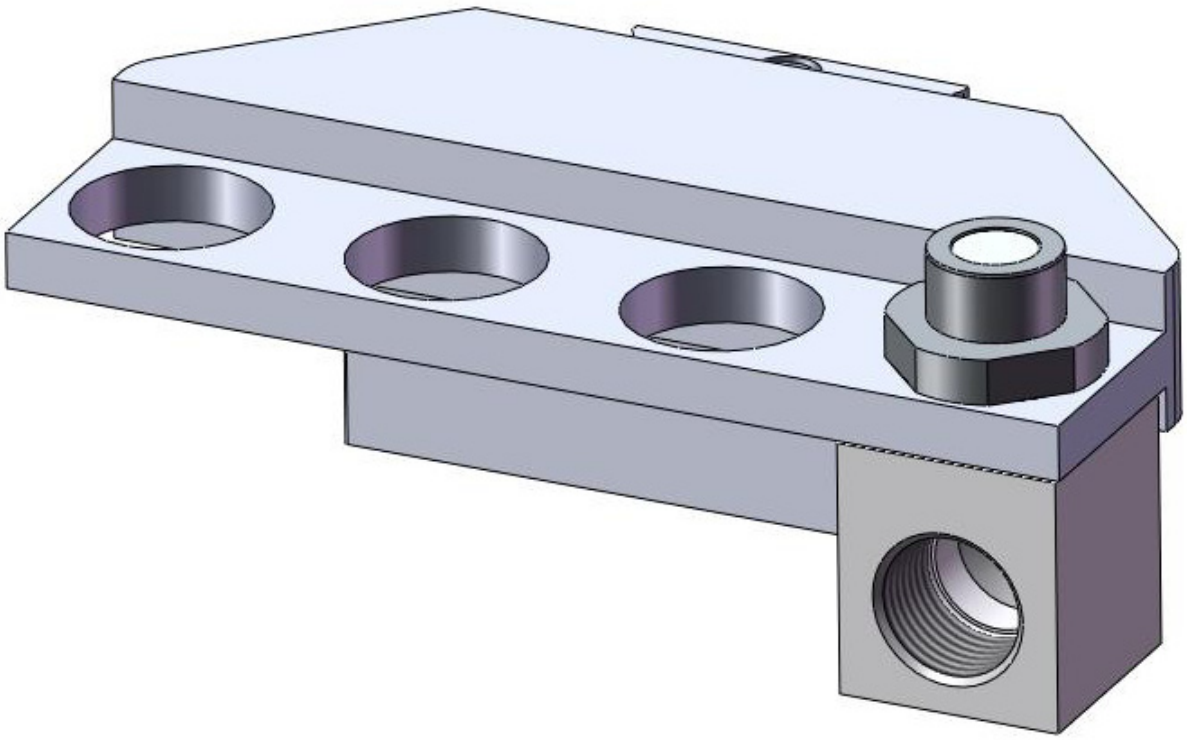


9 Module Variations

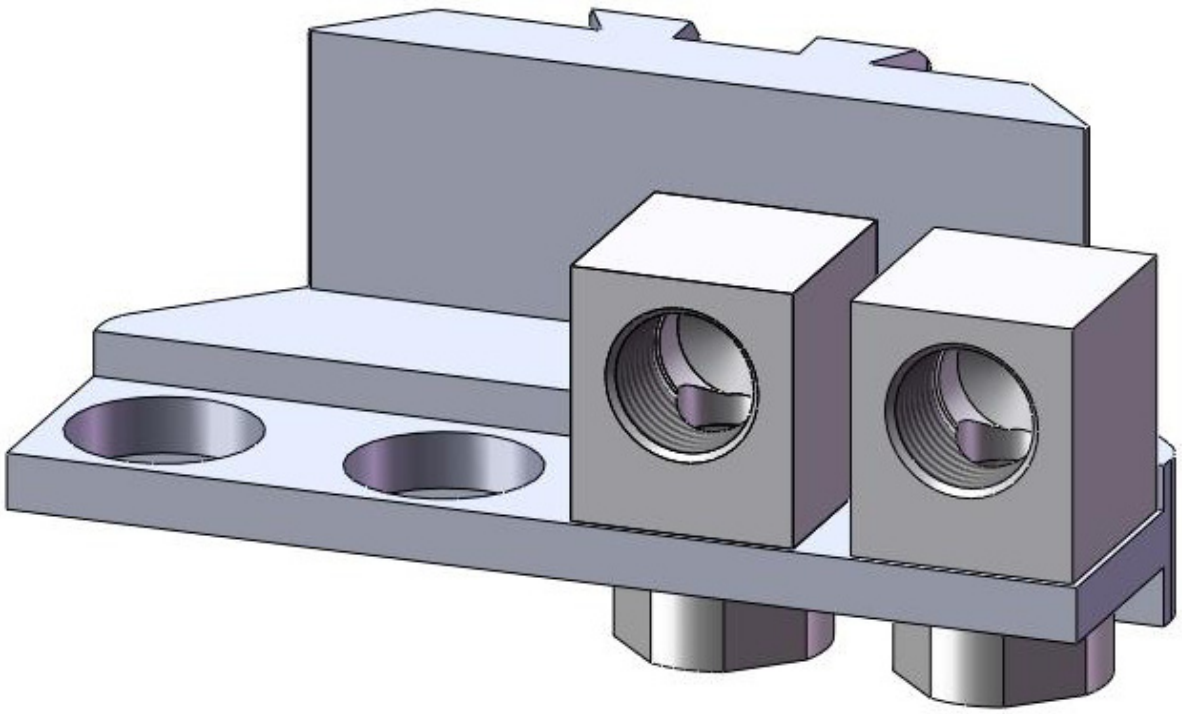
SMR-F-A1N / SMR-F-A1G



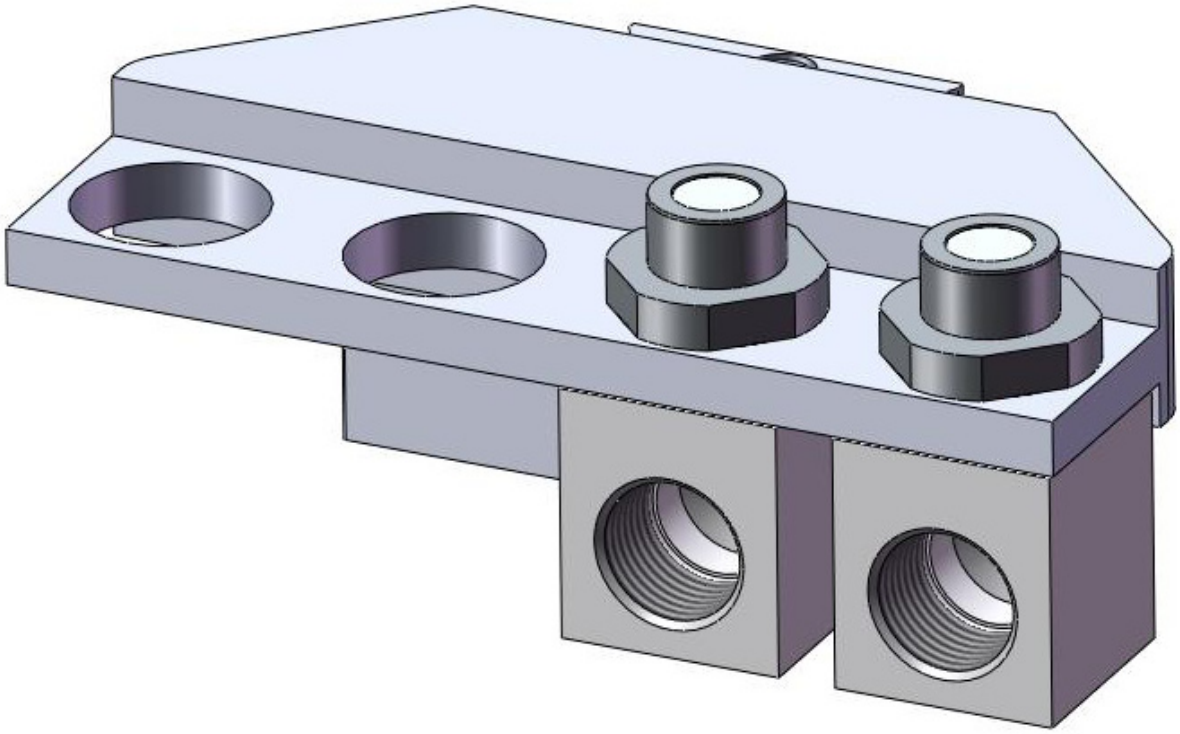
SMT-F-A1N / SMT-F-A1G



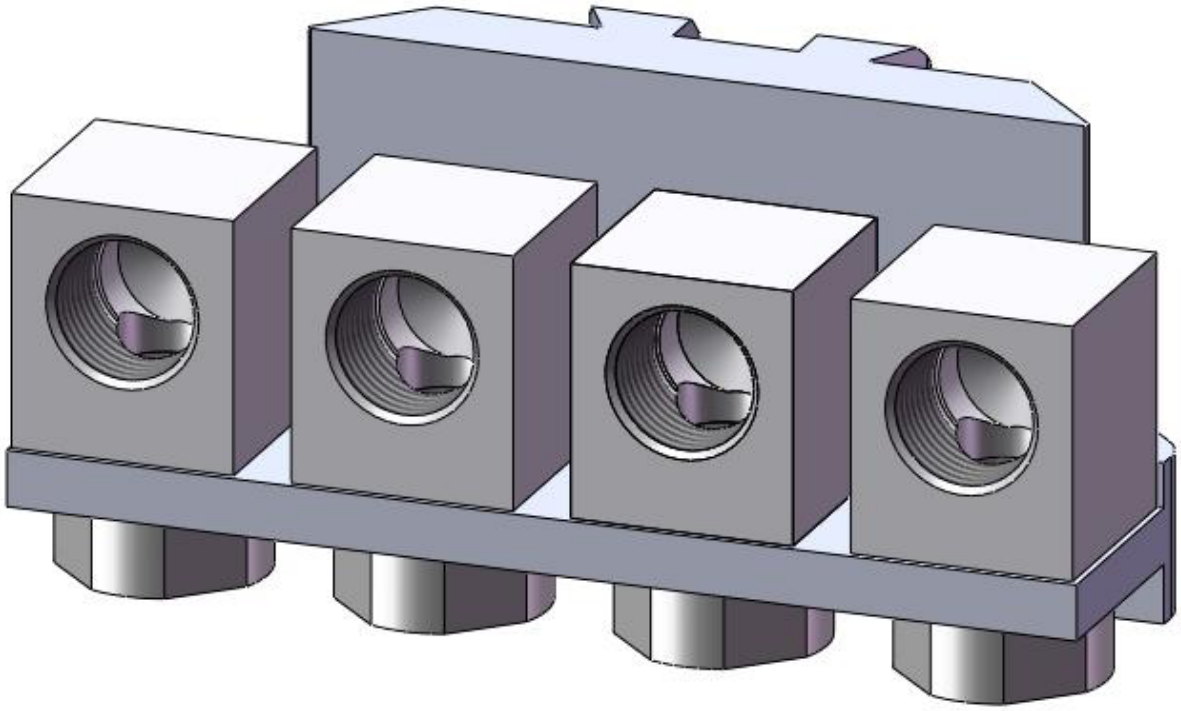
SMR-F-A2N / SMR-F-A2G



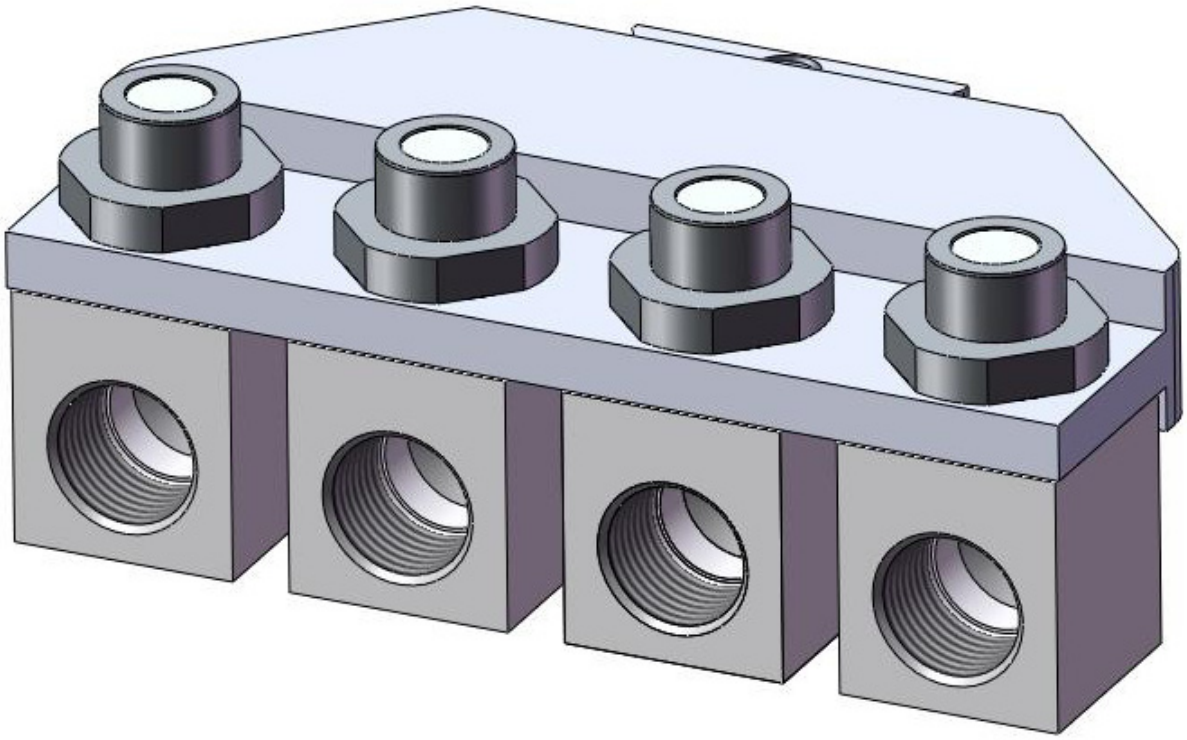
SMT-F-A2N / SMT-F-A2G



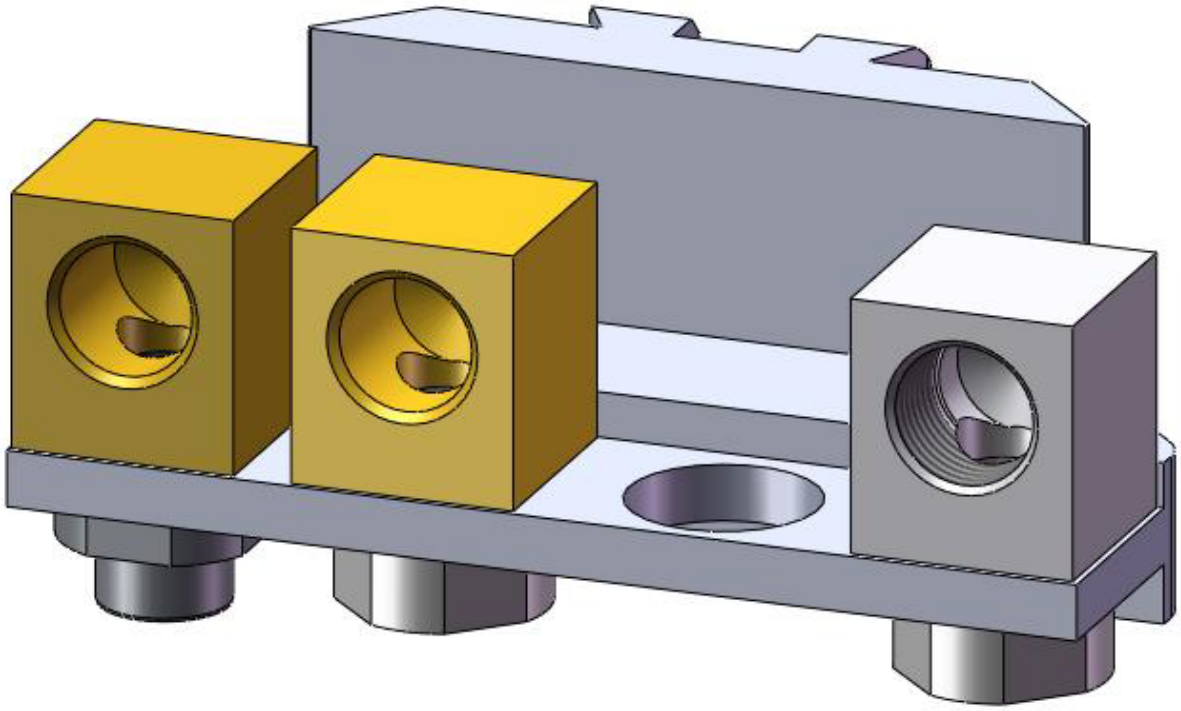
SMR-F-A4N / SMR-F-A4G



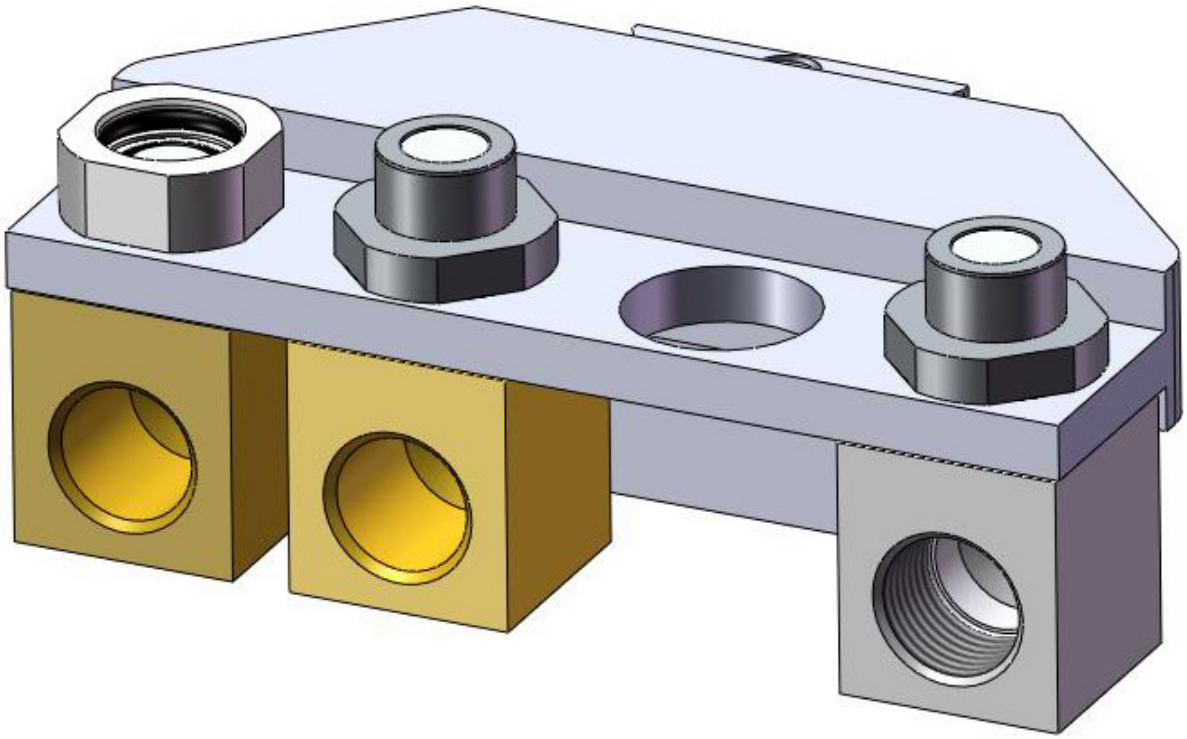
SMT-F-A4N / SMT-F-A4G



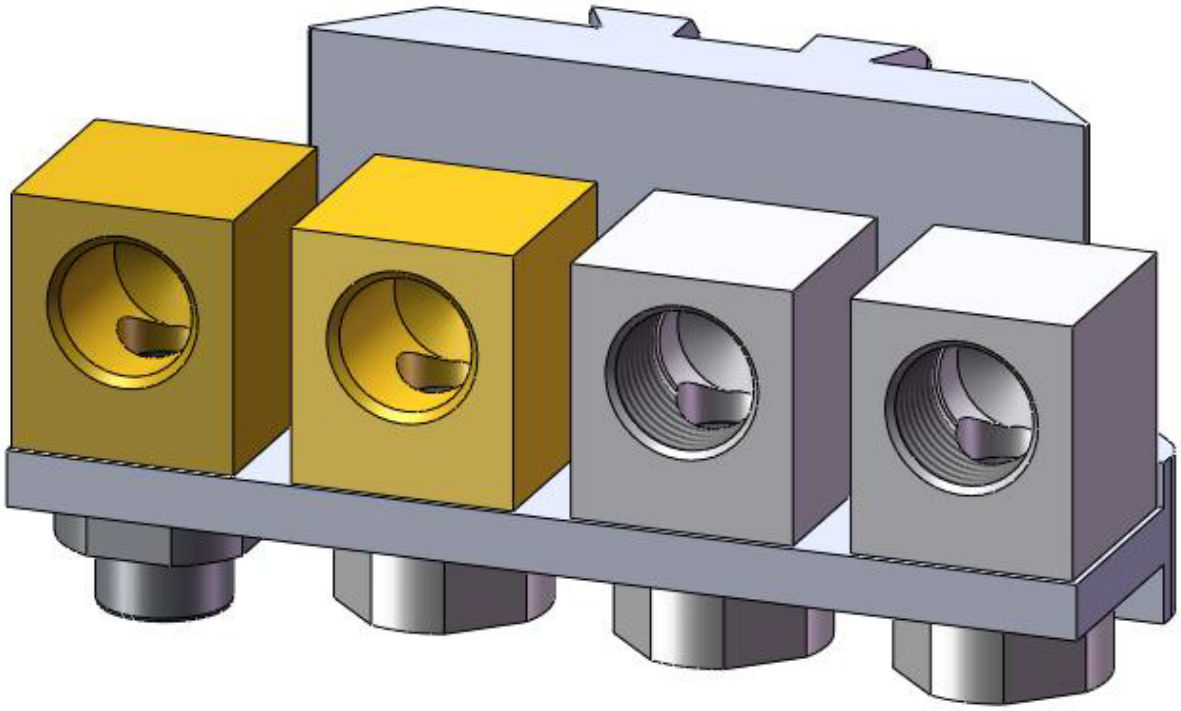
SMR-F-A1C2N / SMR-F-A1C2G



SMT-F-A1C2N / SMT-F-A1C2G



SMR-F-A2C2N / SMR-F-A2C2G



SMT-F-A2C2N / SMT-F-A2C2G